called "efficiencies" it is difficult to understand. The consumer is supposed to supply a large extra amount of power at his own cost by burning gas to heat the air, and it seems an extremely evident misuse of the word "efficiency" to apply it to the ratio of the diagram so got to the diagram of the central station engine. By a little more liberal burning of gas, the efficiency obtained by this method could quite easily be made higher than unity. On the same principle we might calculate the efficiency of a steam-engine by taking the ratio of the indicator-card from the steam cylinder to that taken from the feed-pump that supplies water to the boiler, and thus obtain an efficiency of, let us say, 50,000 per cent. This is a *reductio ad absurdum* of the method of calculation which is perfectly legitimate and logical. R. H. S.

THE CLASSIFICATION OF THE CÆCILIANS

IN a paper on the structure and affinities of the Amphiumidæ, published in the newly-issued part of the Proceedings of the American Philosophical Society (vol. xxiii. No. 123), Prof. Cope has put forward some views as to the position of the Cæcilians or Apodous Batrachians in the Systema Naturæ, which are worthy of careful consideration. The Cæcilians, Prof. Cope observes, are generally regarded as representing a distinct order of the Batrachian class, which bears the name "Apoda," or "Gymnophiona." The definition of this order given by Mr. Boulenger in his recently published Catalogue of the specimens of these animals in the British Museum is: "No limbs; tail rudimentary; males with an intromittent copulatory organ; adapted for burrowing." Of these definitions Prof. Cope maintains that not one is of ordinal value. "The tail in some Cæcilians is distinct. The intromittent copulatory organ in such species as *Dermophis mexicanus*, *Gymnophis proximus*, and *Herpete ochrocephala* is not a special organ, but merely the everted cloaca. The hard papillæ observed by Günther in *Ichthyophis glutinosus* are wanting in the above-mentioned species, and the protrusion of the cloaca is performed by two special muscles."

As regards the absence of limbs in the Cæcilians, Prof. Cope points out that the extremely rudimentary character of these organs in *Amphiuma* is well known, and that their non-existence has no greater claim to be considered as of ordinal value in the Batrachians than in the adjoining class of Reptiles, where it is in some cases not even a "family" character. Looking to these facts, Prof. Cope proposes to unite the Cæcilians with the Urodele Batrachians, and to class them only as a family, "Cæciliidæ," connected with the more typical forms of the group through the Amphiumidæ.

Messrs. Sarasin, who have recently published a most interesting account of their observations on the development of a species of Cæcilian in Ceylon,[1] seem to have come to nearly the same conclusions as to the correct systematic position of this group of Batrachians.

NOTES

THE Prince of Wales has requested the President of the Royal Society to join the Committee appointed to advise on the organisation of the proposed Imperial Institute.

WE have referred elsewhere to some of the possible results of the meetings held last week in favour of the Imperial Institute. Some very striking features which have been developed in connection with this movement during the last week are, first of all, the considerable desire which has been evinced to enrich various localities with some Jubilee memorial, and, again, the wisdom generally displayed in selecting worthy local objects, such as museums, improved science schools, and the like. All this of course is admirable and entirely to be applauded, but believing as we do that there is a possibility of the Imperial Institute, if properly conducted, doing more good for the future development of science and commerce in Greater Britain than any other single organisation can possibly effect, we hope that it will not be starved in favour of merely local objects. We hear that the women of England have already subscribed a noble sum. This no doubt Her Majesty will hand over to the Institute, if it is organised so as to command the confidence and respect of the various leaders of opinion in this country and in the colonies.

MANY of our readers will attach much importance to Colonel Donnelly's letter, which appears in another column. A large increase in the number of students anxious to enter the Normal School of Science and Royal School of Mines was of course to be expected, and we are glad that this influx has induced the department to take steps to increase the accommodation, and at the same time to insist upon one of the best possible forms of entrance examination; a strict inquiry, namely, into the educational history of each candidate for admission.

THE Norwegian Government has presented a Bill to the Storthing for fixing a standard time for the whole of Norway. The standard time proposed is Greenwich time *plus* one hour.

MR. W. BALDWIN SPENCER, Fellow of Lincoln College, Oxford, has been appointed to the Chair of Biology in the University of Melbourne, and will leave England in about three weeks. Mr. Spencer distinguished himself lately by his important memoir on the pineal eye in lizards.

A NUMBER of eminent men of science have addressed a memorial to the President, Vice-Presidents, and Council of the Royal College of Surgeons of England, suggesting that the legacy bequeathed to the College by the late Sir Erasmus Wilson might with advantage be devoted to the establishment of an institution having for its object "physiological and pathological research." It is pointed out that the want of such an institution in England has long been felt, and more especially of late, when we have had to look to Berlin for information respecting tubercle, and to Paris for experiments on the prevention of hydrophobia. That the Government will do anything in the matter no one is so sanguine as to believe; and it is hardly more probable that the want will ever be supplied by public subscription. There is, therefore, much to be said for the present proposal, and the authorities of the College of Surgeons will, no doubt, give it due attention. It seems strange that in London there should be nothing like the splendid laboratories which exist not only in the capital cities of Europe, but in comparatively small German towns, such as Bonn, Strasburg, and Leipzig.

UNIVERSITY COLLEGE, Liverpool, has reason to congratulate itself on having some remarkably generous and enlightened friends. On Tuesday last it was announced at a meeting of the College Council that Mr. Thomas Harrison, shipowner, of Liverpool, had endowed the Chair of Engineering with 10,000*l.* Only a few weeks ago Sir Andrew Walker, also a citizen of Liverpool, gave 15,000*l.* to build Engineering Laboratories.

ON Thursday last the honorary freedom of the City of London was conferred upon Mr. H. M. Stanley, in recognition of his services as a traveller and explorer in Africa. The presentation was made at a special meeting of the Court of Common Council in the new council chamber at the Guildhall. The City Chamberlain, in making the presentation, referred to "the remarkable development of journalistic enterprise during the Victorian era," observing that Mr. Stanley was the first member of "the class of special travelling and war correspondents" whom the City had enrolled among its freemen. Mr. Stanley was evidently much pleased by the honour done to him, and declared that it would stimulate him to further exertions. After luncheon at the Mansion House, he spoke of the various routes which have been proposed for the expedition for the relief of Emin Pasha.

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[1] "Ueber die Entwicklungsgeschichte von *Epicrium glutinosum*," Arb. Zool. Inst. Würzburg, vii. p. 292 (1885).

Mr. Alfred Russel Wallace lately delivered, at Boston, U.S.A., a course of "Lowell Lectures." He proposes to make a Western tour, in the course of which he will lecture on, among other subjects, "The Darwinian Theory: What it is, and How it is Demonstrated," "The Origin and Use of the Colours of Plants," "The Permanence of Oceans, and the Relations of Islands and Continents," and "The Biological History of Continental Islands, Recent and Ancient." Mr. Wallace is thought by the Americans to be a more effective speaker than most of the eminent Englishmen who have lectured in the United States.

The Indian Survey Staff seems to be considerably undermanned. The Government of the Straits Settlements recently applied to the Government of India for an experienced officer to advise them on the way of placing the system of survey in the colony on a satisfactory footing. As no qualified officer on the former establishment was available, Mr. J. B. N. Hennessey, now on the retired list, was offered the duty, but as he declined it the Straits Settlements Government had to be told that the Government of India could render no assistance on a work so necessary to the development of the colonial resources, and likely to be of so much service to science.

A movement is on foot at Gothenburg for the founding of a free University in that city. A large sum of money has already been subscribed.

The results of the new censuses of France and Germany show a marked falling-off in the rate of increase. In the case of France the rate of increase was low enough before; now it threatens to stop altogether, and in many departments there has been a considerable decrease. The addition to the population in five years has only been 213,857, bringing the total up to 37,885,905. This is equal to an annual rate of only ·1 per cent. per annum. Germany is not quite so bad, but the rate of increase between 1870 and 1880 was abnormally high. The population by the latest returns is 46,844,926 as compared with 45,234,061 five years before; giving an annual rate of increase of ·71 per cent. per annum in 1880-85, as compared with 1·14 per cent. per annum in the previous five years.

The Lieutenant-Governor of the Punjab has proposed to the Government of India the establishment of a University at Allahabad, and has furnished a scheme for such an institution in the capital of his province.

At the afternoon sitting of the Association for the Improvement of Geometrical Teaching, held at University College, on the 14th inst., the President (R. B. Hayward, F.R.S.) in the chair, the Rev. G. Richardson, of Winchester College, read a paper on the teaching of modern geometry, in which he indicated the lines which, in his opinion, a Syllabus on the subject should follow. The draft, which covered an extent of ground too great, we think, for ordinary school-teaching, did not consist of a bare enumeration of the subjects of sections and chapters, but was rendered very interesting by the quaint humour which lightened up and pervaded the whole. The Rev. J. J. Milne read a short note on a part of the above subject, which had been omitted by the previous speaker, viz. the modern treatment of maxima and minima; his strong point was the light to be derived from symmetry in the search for cases of maximum and minimum. Mr. G. A. Storey, A.R.A., read a paper on "Geometry from the Artist's Point of View." In this the writer introduced Euclid and Apelles in converse, and showed the agreement which exists between the purely geometrical method and perspective. The paper was illustrated by numerous drawings of triangles, squares, and cubes. A brief discussion of the several papers followed, and then Mr. E. M. Langley communicated a very simple proof of Feuerbach's theorem (that the nine-point circle touches the in- and ex-circles of the triangle). We may return to the consideration of one or more of the above papers when they have been printed in the Association's Report. Upwards of twenty new members were elected.

We have received a hand-book entitled "Through the British Empire in Ten Minutes with C. E. Howard Vincent, Esq., C.B., M.P." It is intended to accompany a wall-map on which Mr. Vincent has brought together a large amount of useful information about the British Possessions. In his hand-book he glances at the leading characteristics of each of the great groups into which the Empire beyond the seas is divided.

A State weather-service for Pennyslvania is to be formed at Philadelphia by the Franklin Institute. The State Legislature will be petitioned for an appropriation of 3000 dollars for instruments and publications, and it seems to be assumed that so reasonable a request will be readily granted.

The Americans also have a Society for Psychical Research. The Society proposes to issue the next number of its Proceedings as soon as sufficient material can be collected. Apparently it is not quite so easy to get startling evidence of the "psychical" kind in the New World as in the Old.

Describing in an American medical journal the influence of the recent earthquake shocks in Charleston upon the health of the inhabitants, Dr. F. Peyre Porcher, of that city, says that many persons experienced decidedly electrical disturbances, which were repeated upon the successive recurrence of the shocks. These disturbances were generally accompanied by tingling, pricking sensations, like "needles and pins," affecting the lower extremities. One gentleman was completely relieved of his rheumatism; another, who for months was nervous, depressed, and entirely unable to attend to business, regained his former activity and energy.

An interesting sketch of the great Serpent Mound in Ohio is given in *Science* by Mr. W. H. Holmes. It is in the northern part of Adams County, somewhat remote from frequented routes of travel. The entire body of the serpent and the peculiar features of the enlarged portion are all distinctly traceable, and leave no doubt in the mind, Mr. Holmes thinks, as to their artificial character. He is decidedly of opinion that the work should be classed among the products of the religion of the aboriginal races.

Mr. J. H. Stewart Lockhart, of Hong Kong, has addressed, on behalf of the Folk-Lore Society of England, an appeal in the English and Chinese languages, through the press, to students throughout China to co-operate in investigating the folk-lore of that country. He points out that no attempt has been made to deal with this subject as a whole, the work done so far being for the most part of a local character. He now proposes to obtain collections of the lore peculiar to different parts of the empire and its dependencies. Each collection, he goes on, while in itself highly instructive, will be chiefly important as forming a link in the chain of facts from which a general account of the folk-lore of China may be deduced. The Chinese version of the appeal is intended for circulation amongst natives, who, "experience shows, evince a great interest in the subject when once they comprehend its aims and objects." Competent scholars are scattered over the greater part of China, and, as

Mr. Lockhart says: "If willing helpers can be found to assist in the work of collection, the success of the scheme is assured. Failure can only result from want of co-operation and support."

IN a paper entitled "Thirty-six Hours' Hunting among the Lepidoptera and Hymenoptera of Middlesex," reprinted from the *Journal of Microscopy and Natural Science*, Mr. Sydney T. Klein has some interesting notes on the best methods of capturing Lepidoptera. He has found it very useful to take advantage of "the attractiveness of the ladies among the Lepidoptera gentry." To those who have not had experience, or have not persevered in, this art, he says, the result is truly marvellous, and will sound very much like a fairy tale. The good taste possessed by the males of Lepidoptera is shown to the greatest perfection among the Bombycidæ. On several occasions, when on botanical excursions in Hertfordshire, Mr. Klein has taken with him a female of *Bombyx quercus*, or other Bombycidæ, fresh from the pupa; and, in a wooded country, provided the sun was hot and a gentle breeze blowing, he was certain of having, within ten minutes, a dozen of the opposite sex flying round him, and from time to time even settling on his shoulders or hands. On one occasion, after remaining, as an experiment, for some time on the same spot, he counted over forty of these large moths within fifty yards.

NEGOTIATIONS are being carried on in Denmark for the holding of a Fisheries Exhibition in Copenhagen next year.

AN enthusiastic fish-culturist is trying to introduce scaleless fishes into English fresh waters. In a lecture on Fish, lately delivered at Worcester, and now published, Dr. Francis Day, C.I.E., expresses his belief that they will prove worthless for sport, almost, if not entirely, useless as food, and dangerous to handle on account of the spines with which they are protected. These fishes delight to eat other forms of fish-life. "I obtained," says Dr. Day, "a specimen of a common Indian cat-fish at Madras, which I placed in an aquarium that contained some carp. It rushed at one of my poor little fishes, and, before I could interfere, seized it by the middle of its back and shook it until it was dead, as a dog kills a rat."

AT the monthly meeting of the Council of the Sanitary Assurance Association on January 10, the Sanitary Registration of Buildings Bill was re-considered. A report on the draft Bill was submitted, with several clauses re-drawn. The Bill was further amended, and ordered to be printed for final consideration at the next meeting of the Council. It is proposed that the new Bill shall be compulsory with regard to schools, hotels, asylums, hospitals, and lodging-houses, and Clause 6 has been made much more stringent in the matter of qualification of persons entitled to give sanitary certificates.

BARON VON MUELLER, who retains the office of Government Botanist to the colony of Victoria, is about to issue a series of plates with descriptions of the acacias (wattles) of Australia. The work will be similar to the "Eucalyptographia," probably the best and most useful of his publications. For diagnostic purposes he makes use of two characters hitherto overlooked, viz. the number of divisions in the pollen-mass and the position of the seed. The retirement of Baron von Mueller from the direction of the Botanic Garden, some few years since, has enabled him to devote more attention to scientific botany and its applications to practical purposes.

DR. GILES, who was attached as scientific member to the Chitral-Kafirstan Mission, is now stated to be in Calcutta, engaged in writing a report on the geology of that region.

CAPT. PEACOCKE, R.E., is said to be preparing a report, with sketches, of his experiences with the Afghan Boundary Commission.

ON Thursday evening last the Society of Telegraph-Engineers and Electricians held the first general meeting of the session of 1887. Sir Charles T. Bright, the new President, delivered an address on the history of the electric telegraph. Speaking of the progress which has been made since the property of the Telegraph Companies was bought by the State, he said that in 1870, when the transfer was completed, there were 48,378 miles of land wires, and 1622 miles of cable wires (irrespective of railway wires), connecting together 2488 telegraph stations. Now the Post Office has 153,153 miles of wire (including submarine wires) in communication with 5097 offices. In addition, the railway companies have 70,000 miles of wire, making a total of 223,153 miles.

THE additions to the Zoological Society's Gardens during the past week include a Red-fronted Lemur (*Lemur rufifrons* ♂) from Madagascar, a Vervet Monkey (*Cercopithecus lalandii* ♂) from West Africa, presented by Mrs. Pawelzig; a Patas Monkey (*Cercopithecus patas* ♀) from West Africa, presented by Mr. George Ellis; a Common Otter (*Lutra vulgaris*), British, purchased.

OUR ASTRONOMICAL COLUMN

NEW VARIABLES IN CYGNUS.—A new variable of the Algol type (D.M. + 34°, No. 4181, R.A., 1887·0, 20h. 47m. 32·5s., Decl. 34° 13′ 59″·5 N.), has been discovered by Dr. Gould. Its period is about three days in length, and it varies from 7·1 mag. to 7·9 mag. A minimum occurred at about 10h. 19m. G.M.T. on January 17. This discovery raises the number of stars of the type to eight, the other seven being Algol, period 2·49d.; λ Tauri, 3·95d.; S Cancri, 9·48d.; δ Libræ, 2·32d.; U Coronæ, 3·45d.; U Cephei (D.M. 81°, No. 25), 2·49d.; and U Ophiuchi (DM + 1°, No. 3408), 0·839d.

Mr. S. C. Chandler, Jun., in a note in Gould's *Astronomical Journal*, No. 148, calls attention to a new short-period variable very close to the above. This star (Lalande 40083, R.A., 1875·0, 20h. 38m. 30·2s.; Decl. 35° 8′ 24″·6 N.) varies from 6·3 m. to 7·6 m. in a little over fourteen days, the increase occupying about four days, the decrease ten days, with a halt in the latter about midway of its course. Mr. Chandler gives for first elements of the star, 1886 October 3·60 G.M.T. + 14^{d}·04 E.

NEW MINOR PLANET.—Prof. C. H. F. Peters, at Clinton, discovered a new minor planet on December 22. This will be No. 264, and the forty-sixth discovered by Prof. Peters.

A NEW METHOD FOR THE DETERMINATION OF THE CONSTANT OF ABERRATION.—In the *Comptes rendus*, tome civ. No. 1, M. Loewy explains how the principle of his method of determining the amount of astronomical refraction (NATURE, vol. xxxiii. p. 303) can be applied to the determination of aberration also. By means of the two reflecting surfaces forming the double mirror placed in front of the object-glass of an equatorial, the images of two stars situated in different parts of the sky appear, in the field of view, side by side; their angular distance is then to be measured in a known direction. To obtain the amount of aberration it is, of course, necessary to measure a properly chosen pair of stars at successive epochs. The first observation is to be made when the stars are at the same height above the horizon, and the second, after a certain interval, under similar conditions. The comparison of the two measures will give a multiple value of the aberration which is independent of instrumental errors. By a proper choice of the angle of the double mirror employed, of pairs of stars selected for measurement, and of the circumstances of observation, M. Lœwy contends that, by attention to the details which he specifies, a more accurate value of the constant of aberration can be obtained by his method in an interval of three months than could be deduced by the methods hitherto in vogue, liable as these are to systematic error.

THE MADRAS OBSERVATORY.—In his Report for the year 1885, Mr. Pogson states that the volume of telegraphic longitude determinations in India, and the two volumes of hourly magnetical observations made at Singapore between 1841 and 1845, and at Madras between 1851 and 1855, which were men-